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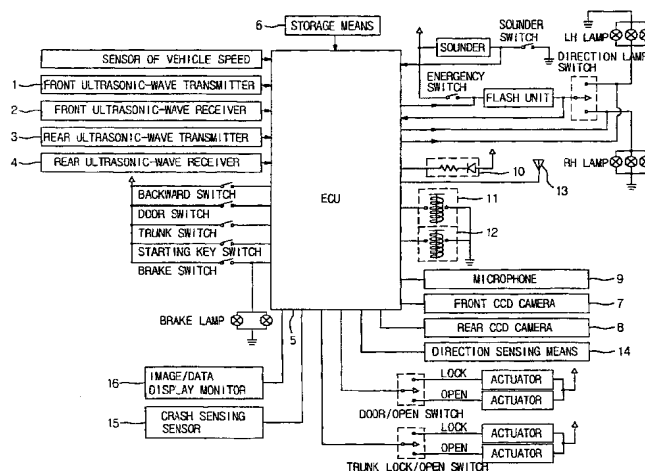
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(54) Title: ELECTRONIC CONTROL APPARATUS FOR VEHICLE



(57) Abstract: There is disclosed an electronic control apparatus for a vehicle which can provide data necessary to clear up the cause of the accident and to find out who is responsible for the accident, by which a warning is automatically given and images and sound around the vehicle are recorded in real-time by an electronic control, when prevention of traffic and burglar accidents are required. For this, the electronic control apparatus for a vehicle according to the present is characterized in that it comprises front/rear signal transmitters/receivers for transmitting/receiving given signals to measure the speed of front/rear vehicles and the distance between his/her own vehicle and the front/rear vehicles, an image pick-up means for picking up images of the front/rear vehicles or the visual field within his/her own vehicle, a microphone for collecting sound around his/her own vehicle, an electronic control unit connected to control the front/rear signal transmitters/receivers, the image pick-up means and the microphone, respectively, and a storage means for storing respective information calculated under the control of the electronic control unit.

## ELECTRONIC CONTROL APPARATUS FOR VEHICLE

### TECHNICAL FIELD

The invention relates generally to an electronic control apparatus for a vehicle capable of preventing a traffic accident and a burglar accident. More particularly, the present invention relates to an electronic control apparatus for a vehicle which can provide data necessary to clear up the cause of the accident and to find out who is responsible for the accident, in a way that an electronic control unit mounted on the vehicle automatically gives a warning and records in real-time images and sound around the vehicle, when prevention of the traffic and burglar accident is required.

### BACKGROUND OF THE INVENTION

A conventional unit for preventing a vehicle burglar can give a warning against intrusion of the vehicle. However, when the owner of the vehicle is at a long distance, there is a problem that the owner does not know instantly the intrusion when it occurred.

Also, the vehicle's traveling recording apparatus for recording the traveling of the vehicle can record only the operational state data on his/her own vehicle's internal system traveling state data on depending on the record of the vehicle. Thus, when an unexpected accident occurred, it is impossible to know the situation of other vehicles and the surrounding road situation.

Accordingly, only with his/her own vehicle's record, it is insufficient to prevent an unexpected accident and to find out who is responsible for the accident. Further, the misjudgment on who is responsible for the accident will cause not only an unfair economic damage but also the loss of manpower.

## SUMMARY OF THE INVENTION

The present invention is to solve the problems of the above conventional vehicle burglar prevention apparatus and the vehicle traveling recording apparatus. The purpose of the present invention is to provide an electronic control apparatus for preventing a traffic accident and a burglar  
5 accident, capable of performing the functions of measuring the speed and distance of front/rear vehicle, monitoring rear objects, recording images and sound of the front/rear visual field and preventing a burglar accident.

In order to accomplish the above object, an electronic control apparatus  
10 for a vehicle according to the present invention is characterized in that it comprises front/rear signal transmitters/receivers for transmitting/receiving given signals to measure the speed of front/rear vehicles and the distance between his/her own vehicle and the front/rear vehicles, an image pick-up means for picking up images of the front/rear vehicles or the visual field  
15 within his/her own vehicle, a microphone for collecting sound around his/her own vehicle, an electronic control unit (ECU) connected to control the front/rear signal transmitters/receivers, the image pick-up means and said microphone, respectively, and a storage means for storing respective information calculated under the control of the electronic control unit.

20 Preferably, the electronic control apparatus for the vehicle according to the present invention further includes a direction sensing means for sensing in real-time the direction where the vehicle is located, wherein the direction sensing means is controlled by the electronic control unit and the direction information calculated by the electronic control unit is recorded on the storage  
25 means.

More preferably, the electronic control apparatus for the vehicle according to the present invention further includes an image/sound recording reset switch for resetting the image and sound information recorded on the storage means.

5 Further, the electronic control apparatus for the vehicle according to the present invention further includes a burglar alarm means for preventing a burglar accident.

Preferably, the burglar alarm means includes a lamp or a sounder for alarming the intrusion by foreigners, and a burglar alarm function reset switch  
10 for resetting a burglar alarm function.

More preferably, the burglar alarm means further includes a burglar-alarm transmit antenna for transmitting, by wireless, the signal alarming the intrusion by the foreigners to the driver located at a long distance.

Also, the signals of the front/rear signal transmitters/receiver are  
15 ultrasonic waves more than 20,000 Hz.

Especially, the storage means is attachable from the electronic control unit, and the storage means may be a HDD (Hard Disk Driver).

Preferably, the storage means is compatible with PCs, and the information recorded on the storage means can be reproduced at the PC.

20 More preferably, the electronic control apparatus for the vehicle according to the present invention further includes a vehicle speed sensor, a backward switch, a door switch, a trunk switch, a start key switch, a brake switch, a sounder switch, a door lock/open switch, a trunk lock/open switch, a direction indicating light switch, a stop light, LH/RH lamps, sounders and  
25 flash units.

Also, the electronic control apparatus for the vehicle according to the present invention may further include a crash sensor for sensing a crash, and

an image/data display monitor for displaying images picked up by the image pick-up means.

## BRIEF DESCRIPTION OF THE DRAWINGS

The aforementioned aspects and other features of the present invention will be explained in the following description, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a block diagram of an electronic control apparatus for a vehicle according to a preferred embodiment of the present invention; and

Fig. 2 shows the locations where the components are mounted on a vehicle according to a preferred embodiment of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention will be described in detail by way of a preferred embodiment with reference to accompanying drawings, in which like reference numerals are used to identify the same or similar parts.

Referring now to Fig. 1, there is shown a block diagram of an electronic control apparatus for a vehicle according to a preferred embodiment of the present invention.

The electronic control apparatus includes front/rear ultrasonic-wave transmitters 1 and 3 for transmitting ultrasonic waves to measure the speed of the front/rear vehicle and the distance between his/her own vehicle and the front/rear vehicle; front/rear ultrasonic-wave receivers 2 and 4 for receiving the ultrasonic waves transmitted by the front/rear ultrasonic-wave transmitters 1 and 3; image pick-up means 7 and 8 for picking up images of the front/rear vehicle or the visual field within his/her own vehicle; a microphone 9 for

collecting sound around his/her own vehicle; an electronic control unit (ECU) 5 connected to control the front/rear ultrasonic-wave transmitters 1 and 3; the front/rear ultrasonic-wave receivers 2 and 4, the image pick-up means 7 and 8 and the microphone 9, respectively, for performing the functions of measuring 5 the speed of the front/rear vehicles and the distance between them, monitoring the rear object, preventing a burglar accident, picking up images of the front/rear and the visual field within the vehicle and recording the sound; and a storage means 6 for storing individual information calculated under the control of the electronic control unit 5.

10 Also, the electronic control apparatus further includes a direction sensing means 14 for sensing in real-time the direction at which the vehicles are located, an image/sound recording reset switch 12 for resetting image and sound information recorded on the storage means 6, a burglar alarm means for preventing a burglar, consisted of a lamp 10 or a sounder for alarming the 15 intrusion by foreigners and a reset switch 11 for resetting a burglar alarm function, a burglar-alarm transmit antenna 13 for alarming by wireless the intrusion by the foreigners to the driver located at a long distance, a crash sensing sensor 15 and an image/data display monitor 16 for displaying the picked up images.

20 The components to which reference numerals and a detailed description are not given include a vehicle speed sensor, various switches (backward motion, doors, trunk, starting key, brake, sounder, door lock/open, trunk lock/open, direction lamp switches, etc.), brake lamps, LH/RH lamps, sounders, flash units etc., which are also controlled by the ECU and are not

important for the present invention. Thus, a detailed description thereof will be not given for simplicity.

Further, though not shown in the drawing, the components such as a handle steering angle sensor, a throttle body flap, an open angle sensor, an emergency light, a switch for an emergency light, a brake pedal angle switch and a headlight switch etc., may be controlled by the ECU.

It is preferred that the above-mentioned components are mounted at the positions shown in Fig. 2.

In other words, the front ultrasonic-wave transmitter 1/ the front ultrasonic-wave receiver 2 for measuring the speed and distance of the front vehicle are installed on the fascia board in front of the driver's seat. Also, the front ultrasonic-wave transmitter 3/ the front ultrasonic-wave receiver 4 for measuring the speed and distance of the rear vehicle are installed on the license plate behind the vehicle.

Further, the ECU 5 and the storage means 6 are installed on the seal within the trunk and may be also installed at the bottom of the driver's seat (not shown).

The image pick-up means for picking up images of the front visual field, for example, a front infrared CCD camera 7 is mounted in the upper middle of the front window shield within the vehicle room from which the front visual field can be obtained. Also, the image pick-up means for picking up images of the rear visual field, for example, a rear infrared CCD camera 8 is mounted in the upper middle of the rear window shield within the vehicle room from which the front visual field can be obtained. Each of the image pick-up means may be mounted on the right of the driver-seat head support and on the

left of the assistant-seat head support (not shown). By allowing the image pick-up means to focus the rear mirror, the front and rear visual fields of the vehicle can be picked up.

Also, the microphone 9 for collecting sound around the vehicle is  
5 mounted on the upper of the driver' seat. The microphone 9 may include "on" and "off" function switches. The driver could adjust automatically or manually the front/rear infrared CCD cameras 7 and 8.

Further, the lamp 10 for informing whether the burglar alarm function must be operated or not is mounted on the fascia board, and the burglar alarm  
10 function reset switch 11 and the image/sound recording reset switch 12 are mounted near the driver around the fascia board.

The antenna 13 for alarming by wireless the intrusion by the foreigners to the driver located at a long distance may be mounted around the window shield or the rear window shield within the vehicle room. The direction  
15 sensing means 14 for sensing the direction at which the vehicle is currently located is mounted on the fascia board. The direction information sensed by the direction sensing means may be displayed on an additional display means.

Also, it is preferred that the crash sensing sensor 15 is mounted at the bottom of the driver' seat. The image/data display monitor 16 is mounted on  
20 the fascia board or at a given region on the fascia board so that the driver can easily view.

The electronic control apparatus having the above components mainly have a front vehicle speed sensing function, a rear vehicle speed sensing function, a front vehicle near-distance measuring function, a rear vehicle near-  
25 distance measuring function, a rear object monitoring function, a burglar



prevention sensing function, a front/rear visual field image and sound recording function, a vehicle direction function, and various vehicle data recording functions and image display monitoring functions. Placing the focus on those functions, the effects of the present invention will be below explained in detail.

1. Front vehicle speed sensing function

The ECU 5 periodically controls the front ultrasonic-wave transmitter 1 to transmit the ultrasonic wave signal. When the front ultrasonic-wave receiver 2 receives the ultrasonic-wave signal that is transmitted by the front ultrasonic-wave transmitter 3 and is then reflected by the front vehicle, the ECU 5 uses the received ultrasonic-wave signal and the signal inputted at the vehicle speed sensor to calculate the speed of the front vehicle.

Then, it records the calculated speeds of his/her own vehicle and of the front vehicle on the storage means 6.

For this, the ECU 5 is consisted of a power regulator, an analog-to-digital converter, a shift register, a digital signal processor (DSP), a program processor, a random access memory (RAM), a read only memory (ROM), a battery and a flash memory, etc.

2. Rear vehicle speed sensing function

The ECU 5 periodically controls the rear ultrasonic-wave transmitter 3 to transmit the ultrasonic wave signal. When the rear ultrasonic-wave receiver 4 receives the ultrasonic-wave signal that is transmitted by the rear ultrasonic-wave transmitter 3 and is then reflected by the rear vehicle, the ECU 5 uses the received ultrasonic-wave signal and the signal inputted at the vehicle speed sensor to calculate the speed of the rear vehicle.

Then, it records the calculated speeds of his/her own vehicle and of the rear vehicle on the storage means 6.

### 3. Front vehicle near-distance measuring function

If the ECU 5 determines that the rear switch on the rear gear side is  
5 “off”, it controls the front ultrasonic-wave transmitter 1 to transmit the ultrasonic wave signal. Thus, when the front ultrasonic-wave receiver 2 receives the ultrasonic wave signal that is transmitted by the front ultrasonic wave transmitter 1 and is then reflected by the front vehicle, the ECU 5 uses the received ultrasonic-wave signal to calculate the distance with the front  
10 vehicle and then to record the calculated data on the storage means 6.

At this time, the recorded data is compared with the reference value previously set. Thus, if danger of an accident is sensed, an alarm is operated to ring, thus inducing the driver into a safe driving. For example, if the near-distance with the front vehicle is below 10m, both the speed of his/her own  
15 vehicle and the front vehicle is over 50km/h and the speed of his/her own vehicle is faster 10km/h than that of the front vehicle, the sounder or the emergency light is operated to warn that the driver can keep a safe distance.

On the other hand, if the brake switch in his/her own vehicle is “on” while the speed of the front vehicle is below 100km/h, the ECU 5  
20 automatically performs the rear vehicle near-distance measuring mode that will be described later.

### 4. Rear vehicle near-distance measuring function

If the ECU 5 determines that the backward switch on the rear gear side is “off”, it controls the rear ultrasonic-wave transmitter 3 to transmit the  
25 ultrasonic wave signal. Thus, if the rear ultrasonic-wave receiver 4 receives

the ultrasonic wave signal that is transmitted by the rear ultrasonic wave transmitter 3 and is then reflected by the rear vehicle, the ECU 5 uses the received ultrasonic-wave signal to calculate the distance between his/her own vehicle and the rear vehicle and then to record the calculated data on the storage means 6.

Using the calculated distance and speed, the ECU 5 controls the emergency light for a safe driving as follows:

For example, if the near-distance with the rear vehicle is below 10m and the speed of the rear vehicle is over 100km/h, the emergency light switch of his/her own vehicle is operated for a given time period (i.e., several - tens of seconds), so that the driver can keep a safe distance with the rear vehicle.

Then, if the ECU 5 determines that the brake switch of his/her own vehicle is "on" while sensing the rear vehicle, it continues to operate the emergency light switch. Then, if the ECU 5 determines that the distance with the rear vehicle is below 10m and the speed of the rear vehicle is below 30km/h, it operates the emergency light switch for a given time period (i.e., several - tens of seconds) and then stops the operation of the emergency light.

Also, if the ECU 5 determines that the speed of the rear vehicle is below 10km/h, the brake switch is "on" and the distance with the rear vehicle is below 3m, it determines that a traffic jam has occurred and thus operates the emergency light switch for a given time period (i.e., several - tens of seconds).

However, there is given priority to the direction indicator lamp switch or the emergency light switch operation by the driver over the emergency light control by the ECU.

In other words, if the direction indicator lamp switch or the emergency light switch is “on” while the starting key switch is “on”, there is given priority to the direction indicator lamp switch or the emergency light switch operation by the driver over the emergency light control by the ECU. If the operation by the driver is finished, the ECU 5 resumes the emergency light control function.

While performing (1) the front vehicle speed sensing function, (2) the rear vehicle speed sensing function, (3) the front vehicle near-distance measuring function and (4) the rear vehicle near-distance measuring function, if the ultrasonic waves same with his/her own vehicle’s ultrasonic waves are continuously received from other vehicles, the transmit/receive ultrasonic wave signals of his/her own vehicle can be changed or decoded into different signals so that the ultrasonic wave signal of his/her own vehicle can be discriminated from those of the other vehicles.

#### 5. Rear object monitoring function

If the ECU 5 determines that the backward switch of his/her own vehicle is “on”, that is, if the vehicle moves backwardly, it controls the rear ultrasonic-wave transmitter 3 to transmit the ultrasonic wave signal. Thus, if the rear ultrasonic-wave receiver 4 receives the ultrasonic wave signal that is transmitted by the rear ultrasonic wave transmitter 3 and is then reflected by the rear objects or persons, the ECU 5 uses the ultrasonic-wave signal to calculate the distance between the objects or persons and his/her own vehicle and then to record the calculated data on the storage means 6.

In the same manner, if there is any danger of an accident, for example if the calculated distance is below 2m, the ECU 5 operates the sounder in a

given times and operates the emergency light for a given time period (i.e., several - tens of seconds), thus inducing the driver into a safe driving.

6. Burglar prevention sensing function

If the driver switches the door lock/open switch into a lock state within  
5 a given time (i.e., 3 minutes) after turning "on" the burglar alarm function  
reset switch 11 one times and then turns "off" all the switches while the  
vehicle's starting key is "off" and respective door switches (four in a four  
door vehicle) are "off", the ECU 5 operates the burglar prevention sensing  
function. At this time, the ECU 5 outputs a control signal to flicker the  
10 burglar alarm function lamp 10.

It is preferred that when the driver operates the burglar prevention  
monitoring function, the front/rear infrared CCD cameras 7 and 8 are oriented  
toward the doors so that intrusion by the foreigners can be easily picked up.

During the operation of the burglar prevention monitoring function, if  
15 the ECU 5 senses, for example, that any of the vehicle's door switches is "on"  
while not sensing the open signal of the door lock/open switch or that the  
trunk switch 15 is "on" while not sensing the open signal of the trunk  
lock/open switch, it continuously operates the sounder to warn that the  
foreigners has intruded.

20 At this time, the ECU 5 continuously transmits the telephone-  
originating signal to the telephone, the home automation system, cellular  
phones of the driver via the antenna 13.

Upon a burglar alarm, for example, if the vehicle's door switch is "on"  
and there is no any door lock/open switch signal while the starting key switch  
25 is "off" and the burglar alarm function switch is "on" one times, the front/rear

infrared CCD cameras 7 and 8 and the microphone 9 are operated to collect the images and sound around the vehicle and then to record the collected data on the storage means 6. As it is the infrared camera, the images around the vehicle can be clearly picked up when the foreigners intrude into the vehicle even at night.

Also, in a parking state, if there is any shock given to his/her vehicle by persons or vehicles, for example, when the crash sensing sensor 15 transmits the signal indicting that the crash has occurred to the ECU 5 while the starting key switch is "off", the front/rear infrared CCD cameras 7 and 8 and the microphone 9 are operated to collect the images and sound around the vehicle and then to record the collected data on the storage means 6.

If the driver wants to cancel the burglar prevention monitoring function, he/she can turn "on" the reset switch 11 twice. Then, the ECU 5 stops the burglar prevention monitoring function, turns "off" the burglar alarm function lamp 10 and stops operating the front/rear infrared CCD cameras 7 and 8 and the microphone 9.

#### 7. Front/rear visual field image and sound recording function

As a result of performing the front vehicle speed sensing function and the front vehicle near-distance measuring function while the vehicle travels (for example, the starting key is "on", or when the generated vehicle speed sensor signal is sensed or the backward switch is "off"), if the distance between the front vehicle and his/her own vehicle is below a given distance (for example, 10 m), the ECU 5 operates the front/rear infrared CCD cameras 7 and 8 and the microphone 9 to record the traveling state of the front vehicle and the images of the traveling lane and its surrounding sound on the storage

means 6. At this time, the speed and near-distance of the front vehicle are also recorded.

Also, as a result of performing the rear vehicle speed sensing function and the rear vehicle near-distance measuring function, if the distance between the rear vehicle and his/her own vehicle is below a given distance (for example, 10m), the ECU 5 operates the front/rear infrared CCD cameras 7 and 8 and the microphone 9 to record the traveling state of the rear vehicle and the images of the traveling line and its surrounding sound on the storage means 6. At this time, the speed and near-distance of the rear vehicle are also recorded.

Also, if the burglar alarm sensing function is operated to warn that the foreigners have intruded into the vehicle while the vehicle is parked (for example, the starting key is “off”, or when it could not sense the generated vehicle speed sensor signal or the backward switch is “off”), the ECU 5 operates the front/rear infrared CCD cameras 7 and 8 and the microphone 9 to record the images of the front/rear visual field state and its surrounding sound on the storage means 6.

Also, as the storage capacity of the storage means 6 is limited, there is provided an image/sound recording reset switch 12 for allowing the users to reset the image and sound data recorded on the storage means 6, as necessary, when the images of the front/rear visual field state and its surrounding sound are recorded on the storage means 6 for a long time.

For example, if the user turns “on” the image/sound recording reset switch 12 one times, the ECU 5 recognizes it and then stops storing the images of the front/rear visual field state and its surrounding sound. Also, if the user turns “on” the image/sound recording reset switch 12 twice, the ECU

5 recognizes it and then resumes writing the images of the front/rear visual field state and its surrounding sound. At this time, the ECU 5 invalidates the contents shift-registered from the start point of the image/sound record region on the storage means 6 and then controls the image and sound to be recorded  
5 from the start point of the image/sound record region on the storage means 6.

Also, during the operation of performing the images of the front/rear visual field state and its sound recording, if there is no any region on which the images and sound are recorded since the image/sound regions to be recorded on the storage means 6 are full, the ECU 5 controls the storage  
10 means 6 to shift-register the image and sound on the image and sound recording region on the storage means 6 from the start point.

As another example, if the image/sound recording reset switch 12 is turned "on" three times in a row, the ECU recognizes it and then shift- registers the state around the vehicle (front and rear visual fields) on the  
15 storage means 6. At this time, for example, the image memory can record one frame per second at the velocity of below 60 km. Also, as the speed of the vehicle become over 60 km, the image memory will increase the number of the frame to be recorded per second. Thus, the image memory records up to 15 frames per second over 150 km. If a traffic accident has occurred, the  
20 image/sound along with the time when the accident occurred is recorded on the ECU 5 or the storage means 6 based on the time when the crash sensor 15 senses the accident by classifying before- and after-the accident into a given time (for example, ECU recording: record during 20 seconds before the accident and during 20 seconds after the accident and then stop, storage



means: continuous recording before the accident, record during 10 seconds after the accident and then stop).

As another example, if the image/sound recording reset switch 12 is turned "on" four times continuously, the images picked up by the CCD cameras 7 and 8 when the vehicle travels and when it is parked is instantly displayed on the image/data display monitor 16.

It is preferred that the storage means 6 is attachable from the ECU 5 and may be also connected to personal computers for reproducing the recording. In particular, all the information recorded on the storage means is attached with year/month/day and time information. Preferably, the storage means 6 may be a HDD (Hard Disk Drive).

Therefore, while the vehicle travels, the images of the front/rear visual field state and its surrounding sound data recorded on the storage means 6 can be utilized as an important data to clear up the cause of the accident and to find out who is responsible for the accident. Also, while the vehicle is parked, the images and sound of its surrounding state recorded on the storage means 6 under the control of the burglar alarm sensing function allow the vehicle owner to easily ascertain who intruded into the vehicle when a burglar accident has occurred.

## 20 8. Vehicle direction function

While the ECU 5 performs the function of recording the vehicle's traveling state or the image and sound of the front/rear visual field state as mentioned above, it receives the direction data on the current vehicle inputted from the direction sensing means 14 and records the received data on the storage means 6 along with the image and sound data. The direction data of

the current vehicle allows clearing up the cause of the accident and finding out who is responsible for the accident. The direction information sensed by the direction sensing means 14 may be displayed on an additional display apparatus.

5 In addition to the above functions, various data recorded on the ECU 5 and the storage means 6 can be used to have the function by which the data can be deleted by the input of password by the driver and the function by which additional password can be coded in order to prevent cheating of the data. Also, for the purpose of protecting the recorded data from the vehicle's  
10 fire, the function of blocking the power supply of the vehicle after the crash sensor 15 senses the crash can be added. At this time, it should be understood that even through the power supply in the vehicle is block, an assistant power supply (i.e., battery) may perform the above functions.

As can be understood from above description, the present invention  
15 uses the data (image on the vehicle's front/rear visual fields, the driver's voice and sound around the vehicle, the speed and direction of his/her own vehicle, the speed of the front/rear vehicle, the distance with the front/rear vehicle etc.) recorded on the recording medium when a traffic accident has occurred. Thus, it can prevent damages due to unfair misjudgment on the accident.

20 Also, the present invention calculates the speed of the front/rear vehicles and his/her own vehicle and the distance between the front/rear vehicle and his/her own vehicle. Thus, the present invention can prevent a traffic accident in advance by warning the calculated data to the driver, thus inducing the driver into a safe driving.

Further, the present invention can detect the intrusion into the vehicle by the foreigners and then inform it to the driver located at a long distance by wireless, along with the sound alarm. Thus, the driver can take an adequate action since he/she can remotely confirm the intrusion by the foreigners.

5 Also, the driver can easily confirm the invasion after the burglar accident has occurred, using the data (image on the vehicle's front/rear visual field, the driver's voice and sound around the vehicle, direction of his/her own vehicle) recorded on the recording medium.

In particular, as the present invention adopts an infrared CCD camera,  
10 the surrounding state when the accident occurred could be easily confirmed even though the traffic or burglar accident occurred at night.

The present invention has been described with reference to a particular embodiment in connection with a particular application. Those having ordinary skill in the art and access to the teachings of the present invention  
15 will recognize additional modifications and applications within the scope thereof.

It is therefore intended by the appended claims to cover any and all such applications, modifications, and embodiments within the scope of the present invention.

20

## CLAIMS

What is claimed is:

1. An electronic control apparatus for a vehicle comprising:
  - 5 front/rear signal transmitters/receivers for transmitting/receiving given signals to measure the speed of front/rear vehicles and the distance between his/her own and said front/rear vehicles,  
an image pick-up means for picking up images of said front/rear vehicles or the visual field within his/her own vehicle,
  - 10 a microphone for collecting sound around his/her own vehicle,  
an electronic control unit (ECU) connected to control said front/rear signal transmitters/receivers, said image pick-up means and said microphone, respectively, and
  - a recording means for recording respective information calculated  
15 under the control of said electronic control unit.
2. The electronic control apparatus for a vehicle according to claim 1,  
further including a direction sensing means for sensing in real-time the  
direction where the vehicles are located, and wherein said direction sensing  
20 means is controlled by said electronic control unit and said direction  
information calculated by said electronic control unit is recorded on said  
storage means.

3. The electronic control apparatus for a vehicle according to claim 1, further including an image/sound recording reset switch for resetting the image and sound information recorded on said storage means.

5 4. The electronic control apparatus for a vehicle according to claim 1, further including a burglar alarm means for preventing a burglar accident.

5. The electronic control apparatus for a vehicle according to claim 4, wherein said burglar alarm means includes a lamp or a sounder for alarming  
10 the intrusion by the foreigners and a burglar alarm function reset switch for resetting a burglar alarm function,

6. The electronic control apparatus for a vehicle according to claim 4, wherein said burglar alarm means further includes a burglar-alarm transmit  
15 antenna for transmitting, by wireless, the signal alarming the intrusion by the foreigners to the driver located at a long distance.

7. The electronic control apparatus for a vehicle according to claim 1, wherein the signals of said front/rear signal transmitters/receiver are ultrasonic  
20 waves.

8. The electronic control apparatus for a vehicle according to claim 7, wherein the ultrasonic waves are more than 20,000 Hz.

25 9. The electronic control apparatus for a vehicle according to claim 1, wherein said storage means is attachable from said electronic control unit.

10. The electronic control apparatus for a vehicle according to claim 1, wherein said storage means is a HDD (Hard Disk Driver).

11. The electronic control apparatus for a vehicle according to claim 10,  
5 wherein said storage means is compatible with PCs and information recorded on the storage means is reproducible at said PC.

12. The electronic control apparatus for a vehicle according to claim 1, further including a vehicle speed sensor, a backward switch, a door switch, a  
10 trunk switch, a starting key switch, a brake switch, a sounder switch, a door lock/open switch, a trunk lock/open switch, a direction indicating light switch, a stop light, LH/RH lamps, sounders and flash units.

13. The electronic control apparatus for a vehicle according to claim 1,  
15 further including a crash sensor for sensing a crash.

14. The electronic control apparatus for a vehicle according to claim 1, further including an image/data display monitor for displaying images picked up by said image pick-up means.

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FIG. 1

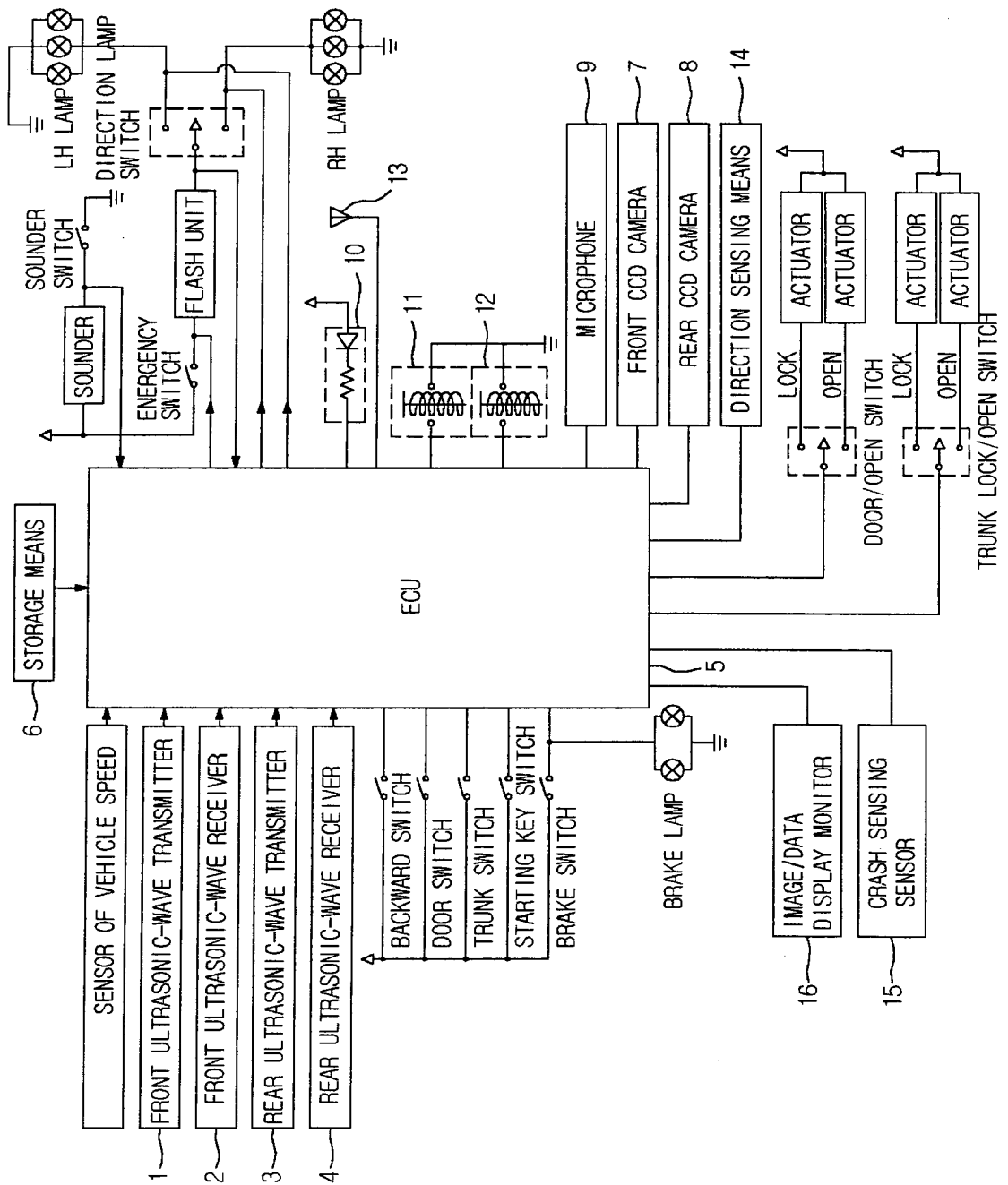
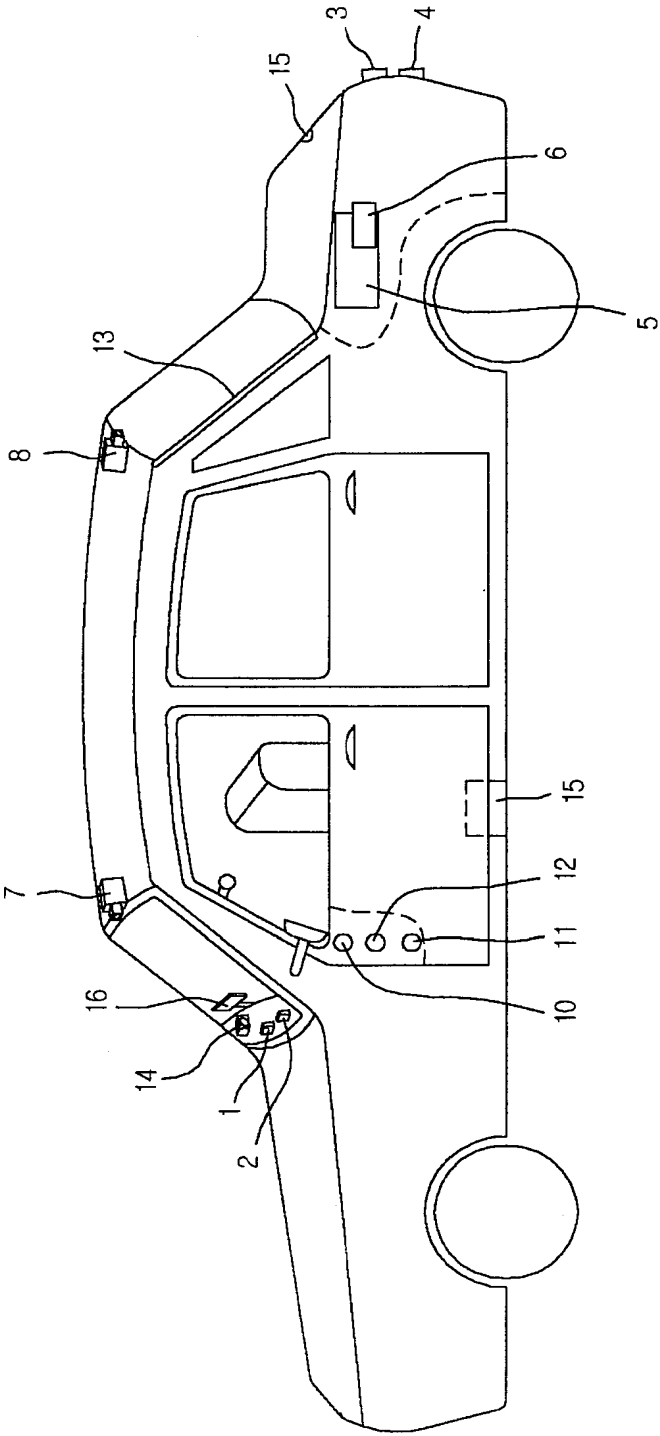


FIG. 2





## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR00/01007

**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 G01C 22/00**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the files searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 99-201888 B ( HYUNDAI MOTOR. CORP.) 17 MARCH 1999	1 - 14
Y	KR 94-3077 B ( LEE, SANG MOON) 13 APRIL 1994	12
Y	KR 97 - 770 B ( LEE, JUNG JAE ) 18 JANUARY 1997	3, 13, 14
Y	KR 98-61482 A ( KIM, BONG TAK ) 7 OCTOBER 1998	2
Y	KR 99-242203 B ( HYUNDAI MOTOR CORP.) 9 NOVEMBER 1999	4-7

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 DECEMBER 2000 (19.12.2000)

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